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Naturally the great problems of the cereal rusts receive considerable attention. Regarding the continuation of the rust through the agency of the seed, and Eriksson's "mycoplasm" theory, the arguments are fully presented, but the author regards these assumptions far from proved.

The chapter upon methods of investigation is especially interesting and helpful. No one has done more or better work in this line of research than the author, and he speaks with long experience and wide knowledge. Sixteen pages are devoted to the study of rust problems from the point of view of plant geography, a subject that will grow more and more important as fuller data become available. In taking up the matter of the association of the host plants selected by theaecidial and teleutosporic generations, the author has developed a number of exceedingly ingenious and helpful charts.

The seventy-five pages remaining of the first half of the book are devoted to the absorbing and intricate problems presented by specialization, the limitations of species and races, the origin of heteroecism, and the questions of sexuality. The numerous theories and facts are clearly and ably presented, but one must confess a feeling of disappointment that, after mastering present knowledge and canvassing the views of other writers, no substantial advance is made in formulating an explanation of the problems. It is evident that these questions must await the writer who is a philosopher as well as a scholar.

The second half of the volume is devoted to a detailed account of the 150 or more species that have been studied by cultural methods. An index of species, one of hosts, and a full bibliography complete one of the most important contributions to the study of plant rusts ever published.—J. C. ARTHUR.

Physical chemistry.

STUDENTS and research workers in plant as well as in animal physiology will find Fischer's translation of Cohen's *Physical Chemistry*² an almost indispensable book. This treatise presents those considerations of the general subject which have a close bearing upon physiological phenomena, and presents them in a concise, clear, readable form, with only as much mathematics as is necessary for the establishment of the principles. Besides pure physical chemistry, the book contains a discussion of a number of applications of this science in hygiene, pharmacology, physiology, etc.—discussions which should be eye-openers to many a student of biology. The subject-matter is divided into seventeen lectures, which are numbered serially. A statement of their titles is given here to show the scope of the book: Reaction velocity; Inversion of cane sugar and catalysis in general; The action of ferment; Temperature and reaction velocity; Equilibrium (three lectures); The friction of liquids; Osmotic pressure; The determination of the molecular weight of dissolved substances; The theory of electrolytic dissociation.

² COHEN, ERNST, Physical chemistry for physicians and biologists, translated by Martin H. Fischer. pp. viii + 343. figs. 49. New York: Henry Holt & Co. 1903.

tion (two lectures), and its applications (three lectures); and Electromotive force (two lectures). References to important papers are given by footnotes. At the end of the volume is an index both of subjects and of authors' names, but we look in vain for a table of contents to aid the reader in following the scheme of presentation. The translation is excellent throughout, and well worthy of the accuracy of the original.—B. E. LIVINGSTON.

A premedical text-book.

THIS GENERAL TEXT-BOOK of botany³ is written for premedical and pharmaceutical students in particular and the nonprofessional undergraduate incidentally. Like most German works of its sort, it is divided into three parts: first, a general treatment of the organogeny and cell structure of plants; second, their physiology; third, the general morphology of representatives of the great plant groups. Of these three, the greatest stress is laid upon the first part, which reflects in great measure the views of Goebel as found in his *Organographie* in much detail. The chapters treating of respiration, photosynthesis, and other plant functions are much more elementary, as is the general morphology. There is a wholesome admixture of new illustrations with the time-worn veterans that the author apparently hadn't the heart or the courage to drop by the wayside. In the treatment of what the author calls the "Spezielle Botanik" there is no description nor figure of the sex organs of the liverworts or mosses, and none of the sexual generation of the water ferns, equisetum, selaginella, isoetes, gymnosperms, and angiosperms. The groups of flowering plants described seem to have been selected largely because members of the order afford commercial products. The stamens and pistils are referred to as "geschlechtsorgane." This is an anachronism that does not accord with the views expressed on the alternation of generations, which are quite up to date.—FLORENCE M. LYON.

MINOR NOTICES.

THE FLORA OF PENNSYLVANIA, in preparation many years by the late Professor Thomas C. Porter, has appeared under the editorship of Dr. John K. Small.⁴ It consists of a list of gymnosperms and angiosperms with stations, and is the result of personal exploration and extensive cooperation of others for a period of over sixty years. Professor Porter's ambition was to make his list of Pennsylvania plants complete, and this led him to defer printing it from time to time. When death overtook him in his eightieth year, the work seemed to him not yet perfect enough for publication, but a provision in his will for its publication has enabled Dr. Small to present it to the public. The summary shows that it records 2201 species, which have

³ GIESENHAGEN, K., Lehrbuch der Botanik. Imp. 8 vo. pp. xii + 475. figs. 557. Stuttgart: Fr. Grub. 1903.

⁴ PORTER, THOMAS CONRAD, Flora of Pennsylvania. Edited with the addition of analytical keys by John K. Small. 8vo. xv + 362. Boston: Ginn & Co. 1903. \$2.15.